REPORT

OF THE

CANAL COMMISSIONERS

OF

PENNSYLVANIA,

RELATIVE TO THE

PENNSYLVANIA CANALS

AND

RAIL-ROAD.

READ IN SENATE, December 23, 1830.

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REPORT

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CANAL COMMISSIONERS.

CANAL COMMISSIONERS' ROOM,
December 21, 1830.

His Excellency George Wolf,
Governor of Pennsylvania.

By order of the Board of Canal Commissioners, I have the honor of transmitting to you, their annual report and accompanying documents.

Very respectfully,
JAS. S. STEVENSON,
President of the Board of Canal Commissioners.

The Canal Commissioners of Pennsylvania respectfully submit the following Report:

That in pursuance of the notice of their being continued as the board of canal commissioners, under the act reducing the number of its members, they met at Harrisburg the first day of their official year, and immediately entered upon their duties.

The commissioners, knowing the anxiety of the legislature and citizens of the commonwealth, in relation to the deep interests involved in the state canal, and the importance of its early completion, determined to exert all the power with which they were invested to cause the canal and rail way, to the entire extent authorized by law, to be finished within the present year. They were aware that to accomplish this would require great and persevering exertions on the part of the officers and agents in the service of the state, and with the hope that the presence of the board on the respective divisions to authorize and enforce prompt

and necessary measures, would produce beneficial results, the board concluded to visit the whole line of canal and rail-way as early in the year as possible. By such visit the members of the board could acquire a personal knowledge of every part of the canal; would be enabled to compare the works planned and executed under different engineers; could decide upon the advantages or disadvantages of different arrangements and designs, and authorize the adoption of whatever they believed was most economical and beneficial. Such visit would also afford the opportunity of an acquaintance with the habits, acquirements and competency of the officers and agents on the canal, and would better enable the commissioners to decide upon the justice of claims for damages.

The immediate inspection of the works appeared the more indispensable, as no general examination had been made by any former board, doubtless from the opinion that this service did not come within the range of their duty, under the laws then existing.

The commissioners, therefore, after taking such measures, before leaving Harrisburg, as seemed necessary to insure activity on the several divisions, until reached by the board, adjourned to Johnstown, at which place they commenced their examinations of the canal, on the 5th of July, and continued this duty along the western division to Pittsburg.

From Pittsburg the board proceeded to the head of the Juniata division, and from thence pursued their inspection through the whole line of canal and rail way east of the mountains, giving, as they progressed, such instructions to the agents on the works as seemed most advisable. This tour of duty terminated at Harrisburg, on the 16th of September.

After remaining some time at Harrisburg, attending to the business most pressing on the board, the commissioners separated to give their attention severally on different divisions, with a view to urge the completion of the work in their charge.

The result of the operations of the season have been satisfactory to the commissioners, as they have been enabled to accomplish the leading duty assigned them. The water has been admitted into four hundred and six miles of canal; twenty miles more being the whole extent authorized, requires but the completion of a few pieces of work to be declared finished.

The forty miles of rail way bed directed to be placed under contract, has been graded, bridged and completed, ready for the reception of the rails, excepting only a small amount of work on two sections, and on two bridges.

When it is considered that the first appropriation for the Pennsylvania canal was made as late as the 25th of February, 1826, and then only to the small amount of three hundred thousand dollars; that the first contracts are dated the last of June, 1826; that the first ground was broken the 4th of July of that year, and that now within the year 1830, four hundred and twenty-six miles of canal has been finished, and a considerable part of this through a

country peculiarly difficult, it cannot but be acknowledged that though there have been many errors to regret, there has been also much effected, flattering to the power and beneficial to the interests of the state. Within the short period of four years and five months, an immense amount of labour on our public works has been done, and although unfortunate arrangements and excessive expenditures have, in some cases, taken place, yet great progress has been made in the mighty task the state has undertaken. Much experience has been gained and many errors may, in future, be avoided. Skillful engineers, contractors and workmen have been multiplied, and their capabilities ascertained. The necessity of employing none but faithful, intelligent and experienced engineers, the exclusion of all favoritism, and the strict enforcement of economy in the construction of our public works, has become obvious to all.

The canal and rail-way as far as authorized, being completed, the board are now enabled to make such statements as regards the principal features, general structure and actual cost of these improvements as will give the citizens of the commonwealth (at whose expense they were constructed) a better acquaintance with their great public works than it has hitherto been in the power of the commissioners to present in their annual reports. A condensed view of the leading facts relating to the state canals and of the principal works in its construction presented in a single document, accessible to all, may prove satisfactory to many who have not opportunities of general information on this subject, and may furnish some useful data for calculation and comparison,

In the plan of the Pennsylvania canal, two principal leading lines of communication have been kept in view. The great central line from Philadelphia, crossing the Susquehanna at the mouth of the Juniata, and extending westward to the Ohio river at Pittsburg, and the line diverging from this at the mouth of the Juniata, and pursuing the course of the Susquehanna to Northumberland, and from thence the courses of the West and North branches of that river, with the view of being finally extended throughout the important northern region of the state. The completion of the central line from the mouth of the Juniata to Philadelphia is evidently of equal interest to the east, west and north.

The length of the central line of rail-way and canal from Philadelphia to Pittsburg is three hundred and ninety-seven miles. The water has been introduced into two hundred and ten miles of this line, and twenty miles more are nearly ready to receive it. The central line has been arranged into the following divisions, viz:

THE RAIL-ROAD DIVISION, extending from Columbia to Philadelphia. The whole length of the division from the intersection of Vine and Broad streets, in Philadelphia, to the south end of the canal basin at Columbia, is eighty one miles and three-fourths of a mile. Forty and a half miles of the road bed has been prepared to receive the rails. No other work has been authorized on this division.

CANAL DIVISIONS.

The EASTERN DIVISION, extends from the termination of the rail-road at Columbia, to the outlet lock on Duncan's Island, and is forty two miles and eighty-five hundredths of a mile in length.

Twenty-four miles of this division are navigable. Ten miles more nearly finished. The balance not authorized to be placed under contract.

Part of the Susquehanna division, extending from the outlet lock at Duncan's Island, to the commencement of the Juniata division, on said island. The length of this part of the canal is one mile and fifty eight hundredths of a mile. This portion of the line is navigable.

The JUNIATA DIVISION division, extending from its junction with the Susquehanna division, on Duncan's Island, to the end of section No. 184, one fourth of a mile above Huntingdon, and being eighty-nine miles and five hundredths of a mile in length.

Eighty miles of this division are navigable, the remainder only requires the completion of two aqueducts.

The CANAL AND SLACK-WATER DIVISION, proposed to extend from the end of the canal at Huntingdon, to the head of the canal basin, near Hollidaysburg, as designed by Moncure Robinson. The length of this division will be thirty-nine miles.

No part of this division has been authorized to be placed under contract.

RAIL-WAY OR MACADAMIZED TURNPIKE, extending from the head of the basin, near Hollidaysburg, located by Moncure Robinson, and following the route and plan proposed by him, to the head of the basin, at Johnstown, the distance is thirty-seven miles ninety-three hundredths of a mile.

Various surveys have been made, and different routes and plans have been proposed for this portage, but no part of the line has been authorized to be placed under contract. The lowest depression of the Allegheny mountain, within the range of the portage, is at Sugar Run Gap, and this is one thousand three hundred and sixty-four feet seven inches above top water in the basin, at Hollidaysburg; one thousand one hundred and forty-one feet above the top water line of the basin at Johnstown, and one hundred feet above the bottom of the tunnel, proposed by Moncure Robinson, in his report of last year.

The WESTERN DIVISION of the Pennsylvania canal, extending from the head of the basin at Johnstown, to the out-let lock, into the Monongahela river at Pittsburg. The whole length of this division is one hundred and four miles and thirty-three hundredths of a mile.

This division of the canal, is navigable throughout its whole course, as is also a branch of three fourths of a mile in length, which leads into the Allegheny river, at the town of Allegheny.

The divisions leading northward, from the Juniata, at Duncan's island, and their several lengths are as follows:

The SUSQUEHANNA DIVISION, extending from the out-let lock into the Susquehanna, at Duncan's island, to the south end of the towing path bridge at Northumberland. The length of this division is thirty-nine miles. This division is in navigable order.

The WEST BRANCH DIVISION, extending from the south end of the towing path bridge, at Northumberland, to the end of the towing path, one mile and one fourth above the feeder dam, at Muncy ripples. This division, is twenty-four miles and a half in length, and is in navigable order.

The NORTH BRANCH DIVISION, extends from its point of intersection with the west branch, in the basin, in the town of Northumberland, to the feeder dam at Nanticoke falls, and is fifty-five miles and a half in length.

The water has been admitted into this division, but it is not yet entirely navigable. The slackwater, extends five miles above the Nanticoke dam, and within two miles and a half of Wilkesbarre.

The other divisions of canal are,

The DELAWARE DIVISION. This extends from the tide basin at Bristol, to the north side of the feeder dam at Easton. Its length is fifty-nine miles and three fourths. The water has been admitted into this division, but only twenty-five miles are yet navigable. Part of the work first constructed, has proved defective, and requires extensive repairs.

The FRENCH CREEK FEEDER, extends from near Bemus' mill, on French creek, to its termination at Muddy run. Its length is nineteen miles and a half. The water has been admitted into this line from some small streams.

Although the canal and rail way has been arranged into divisions, and these into lines, and though no connection is meditated between some of the divisions, yet appropriations have been made under the general name of the Pennsylvania canal and rail way. Accounts have, however, been kept, with reference to divisions and lines.

From these accounts, it appears that the whole amount of moneys appropriated for the Pennsylvania canal and rail road, and placed at the disposal of the canal commisssioners, up to the 10th of December, 1830, has been ten millions two hundred and eighty-eight thousand three hundred and nine dollars and fifty-nine cents.

The whole amount drawn from the treasurer, after deducting all sums repaid, has been ten millions two hundred and eighty-three thousand seven hundred and sixty eight dollars and eighty-nine cents.

These sums have been drawn under the following heads:

WESTERN DIVISION.

By superintendents of construction,	$2,567,496 94	
By supervisors,	41,600 00	
		$2,609,096 94

JUNIATA DIVISION.		
By superintendents, &c.	$2,240,301 16	
Supervisors,	16,689 47	
		$2,256,990 63
DELAWARE DIVISION.		
By superintendents, &c.	1,168,385 61	
Supervisors,	10,000 00	
		1,178,385 61
EASTERN DIVISION.		
By superintendents, &c.	1,202,830 11	
Supervisors,	11,233 64	
		1,214,063 75
NORTH BRANCH DIVISION.		
By superintendents, &c.	1,002,483 03	
Supervisors,	5,000 00	
		1,007 483 03
WEST BRANCH DIVISION.		
By superintendents, &c.	349,004,87½	
Supervisors,	5,600 00	
		354,604 87½
FRENCH CREEK FEEDER.		
By superintendents, &c.	287,103 72	
Supervisors,	5,00000	
		292,103 72
RAIL-ROAD.		
By superintendents, &c.		287,584 56½
SUSQUEHANNA DIVISION.		
By superintendents, &c.	1,039,256 77	
Supervisors,	9,200 00	
		1,048,456 77
Board of canal commissioners,		29,000 00
Board of appraisers,		54 00
Board of internal improvement,		5,990 00
Balance in the treasury,		4,540 70
		$10,288,309 59

Of the amount thus drawn, settlements have been made at the treasury, of upwards of ten millions one hundred and fifty thousand dollars, and the accounts shewing the application of the balance, are in a train of adjustment.

It will be perceived that to form the necessary connections between the parts of the canal already finished, so as to fulfil the original design, and render the canal productive, will require the completion of the rail-way between Philadelphia and Columbia; the completion of nine miles of canal between Middletown and Marietta; of thirty-nine miles of canal and slack-water navigation;

and of thirty-eight miles of portage road, between the canal at Huntingdon, and the canal at Johnstown. These works may be justly viewed as necessary and profitable connexions, and not as extensions. The Board have therefore deemed it proper to embrace them in this statement, in relation to the general work.

As a brief view of the several divisions of the canal and rail-way, and of the necessary connecting works, may be satisfactory, the following remarks are made.

The Philadelphia and Columbia Division of the Pennsylvania rail-road, commences at Philadelphia, and runs westward, through the counties of Philadelphia, Montgomery, Delaware, Chester and Lancaster to Columbia, and there connects with the great central line of canal and portage, leading to Pittsburg, on the Ohio river; from which point an extensive steam boat navigation opens through the vast and productive regions, pervaded by the waters of the Mississippi and its tributary rivers.

The line of location from Philadelphia to the foot of the Schuylkill inclined plane, has not yet been determined. Two principal routes have been specially urged. The one commences at the intersection of Vine and Broad streets, passes along the bed of the abandoned canal, and crosses the Schuylkill, to the foot of the plane, at Peters' farm. The other crosses the Schuylkill at Fairmount, and passes up the western side of that river, to the said plane.

It must be admitted that the weight of public opinion at Philadelphia, favours the first named location. That the line is somewhat shorter, and that by adopting the course and level of the canal bed, the work can be effected at less cost than on the Fairmount route. It is urged, however, by the advocates of the Fairmount route, that the difference of distance and cost will be inconsiderable, and that a large interest west of the Schuylkill, will be respected by running the rail-way to the head of tide, in the Schuylkill, before crossing that stream.

The advocates of each plan, will doubtless submit their views for legislative decision.

The whole line of the Pennsylvania rail-road, from the intersection of Vine and Broad streets, pursuing the old canal line, and crossing at Peters' farm, (which route is assumed with a view to a definite statement of length and cost) to the end of the canal basin, at Columbia, is eighty-one miles and three fourths, only five miles longer than the travelled turnpike road. From Vine and Broad streets, to the foot of the Schuylkill inclined plane, the distance is two miles and two thirds. The foot of the plane is forty-seven feet nine inches above mean high tide, and the rail-way runs nearly on that level, from Philadelphia to the plane.

The Schuylkill plane is two thousand seven hundred and fourteen feet long, and its elevation from foot to head, is one hundred and eighty-five feet. From the foot of this plane, the rail way bed has been completed for a distance of twenty miles and one quarter. The succeeding thirty-six miles and a half have been located, but

have not been placed under contract. The next twenty miles and one third, of the road way, has been finished, reaching to the head of the plane at Columbia. From this point to the canal basin (a distance of one mile and one fourth,) the road way has not been placed under contract The plane at Columbia, is one thousand nine hundred and fourteen feet in length, and has an elevation from foot to head, of ninety feet. The surface line, in the canal basin at Columbia, is two hundred and thirty-seven feet and twenty seven hundredths above mean high tide, in the Schuylkill, at Fairmount. The top water line in the basin, at Columbia, is nineteen feet four inches above low water mark, in the Susquehanna, at the abutment of the bridge over that river. At the head of the inclined plane, at the Schuylkill, it is intended to station a steam engine of from forty to fifty horse power; and one of the same force at the head of the plane at Columbia. The engine at Columbia, will be of sufficient strength to elevate eight hundred tons from the foot to head of the plane, in the day of eleven hours.

As the amount of tonnage going eastward, will greatly exceed that going west, the engine at the Schuylkill, though acting on a longer plane, and one of greater elevation than that at Columbia, will still be able to forward the tonnage to any extent that can be offered.

The line of location of this rail way, seems unparalleled for its facilities and advantages

The highest point on the line, is at the Gap of Mine Ridge, thirty miles from the basin, at Columbia. By a cut of thirty-one feet and one fourth, for a short distance, this is reduced to five hundred and sixty feet above mean high tide to three hundred twenty-seven feet and one fourth above the head of the plane, at the Schuylkill, and to two hundred and thirty-three feet above that at Columbia.

Although the cutting on the location, is generally light, except at the Gap mentioned, yet the elevation will not, on any part of the distance between the head of the plane at the Schuylkill and the head of the plane at Columbia, a space of seventy-seven miles, exceed thirty feet to the mile, in either direction, being less than one third of a degree.

Even on the Liverpool and Manchester rail way, though but thirty-two miles in length, and recently constructed in the most costly and admirable style, under the patronage of the commercial and manufacturing wealth and power of England, upwards of one and a half miles of the road, has unavoidably a graduation of fifty-five feet in the mile. It is found however, in practise on this road, that locomotive engines, which draw forward twenty tons, at the rate of nineteen miles per hour, on a level, can proceed at the rate of seven miles per hour, at this elevation of fifty-five feet to the mile. There can be no doubt, but that a locomotive engine of sixteen horse power, weighing five tons, will draw thirty tons, and twelve waggons, at the rate of six miles per hour, up an elevation, not exceeding a grade of thirty feet per mile, without fear of this

weight causing the engine wheels to slide on the plane, or to have only a rotary motion (of the wheels) without a progressive motion along the plane.

In practice, it will be found, that a locomotive engine, with thirty tons of coal or other loading attached, will be able to travel the whole distance, from Columbia to Philadelphia, in a day of ten hours. The rise in the direction of the greatest trade, viz: from the head of the plane at Columbia, to the summit of Mine Gap Ridge, is but two hundred and thirty-three feet; the rest of the distance is nearly level, or descending. A good Pennsylvania wagon horse, will, on this rail way, convey ten tons a distance of twenty-seven miles per day, with ease.

The country through which the Columbia and Philadelphia rail-way runs, is the most highly cultivated, populous and wealthy part of the state. Through it for many years a large amount of produce floated down the Susquehanna to Columbia, has found its way to Philadelphia.

So considerable has been the travel and transportation on this road from Columbia to Philadelphia, that thirty-five years ago, the inhabitants of Lancaster and Chester counties, with a view to a more easy transportation, undertook the then Herculean labor of making a turnpike road from Lancaster to Philadelphia; by their steady perseverance and solid wealth, they accomplished this heavy task, and made the public their debtors for the example of the first turnpike constructed in the Union.

The spirit of improvement still visits these favored counties and notwithstanding some opposition, will lead their inhabitants to encourage and adopt amongst them one of the most useful and splendid attainments of the present day. The county of Lancaster gave to the world the citizen who first taught the power of steam so beneficially to propel "the vast barge." Its inhabitants will sustain an improvement, along which the same power may as beneficially "whirl the rapid car."

The utility of rail-ways and the advantages of the locomotive engine are no longer matters of experiment or doubt with those who have seen their operations. But as few of our citizens have had such opportunities, it is of general advantage that the first rail-way commenced by the state is located so immediately in the line of travel in Pennsylvania, that thousands of our citizens from various parts of the commonwealth, upon its completion, must unavoidably witness such demonstrations as will satisfy every beholder. The citizens between Columbia and Philadelphia are not alone interested in the completion of this rail-way; as evidences of the advantages of structure will then be established of high interest to every part of the state, not accessible by canals; and when proved to be useful, then by public or private funds, rail ways can be extended in every beneficial or profitable direction, and thus other portions of the state than those now embraced within the range of improvement may equally share the public favor.

The benefits of a rail-way from Columbia to Philadelphia must

be especially felt by the inhabitants, not only by cheapening transportation from their homes, but for a wide extent on each side of the rail-way, by furnishing coal, timber, boards, &c. from distant places, at a cheap rate, to settlements where the agricultural products of each acre are too valuable to admit of being reserved as woodland. The completion of the canal to the exhaustless beds of prime coal in the Wyoming Valley, will insure supplies to any extent; and within one year after the rail-way is finished, coal will be sold at less than three dollars and fifty cents per ton throughout the whole of its course. By means of the rail-way, Lancaster and Chester counties will also have the benefit of being embraced in the great line of communication for the trade between Philadelphia and Pittsburg; between the commercial metropolis of the state and the mart for the reception and distribution of the trade of the extensive west, a trade which even now keeps eight hundred wagons in steady employ.

The business on this road, when the whole communication is arranged with the navigable western waters and with the productive northern regions of our own state, will, within the first year, astonish the most sanguine.

The original cost for grading, bridging and preparing the bed of the rail-way from Columbia to Philadelphia, made in 1828, was four hundred and sixty-two thousand four hundred and forty-one dollars and seventy seven cents.

The following statement shews the principal works on forty miles and a half of the road bed and their actual cost. The road-way is twenty-two feet wide, and has been arranged with a view to a double track.

Cost of excavating, embanking, &c. forty miles and a half,	$164,441 10
10 road and farm bridges, across the rail way, Stone abutments, superstructure of wood, span from thirty-one to fifty-four feet.	13,217 53
12 bridges—forming five hundred and ten feet of the line of the rail-way, principally stone arches,	9,401 28½
5 bridges—forming three thousand five hundred and seventy-eight feet of the line of the rail-way,	63,735 29
25 stone culverts—whole span, one hundred and twenty-eight feet,	8,406 49
70 miles of fencing,	32,592 71
For repairing and protecting embankments,	3,528 64
Incidental expenses,	1,272 55½
Engineer, superintendents, &c.	21,509 00
Additional amount required to pay engineers, superintendents, and contingent expenses,	2,000 00
Amount paid as damages,	525 29
	$320,629 89

From this amount should be deducted $38,874 75, being the value of 57,000 cubic yards of stone, obtained in the excavation of the sections, and which will be of that value in the construction of the rail-way. Its excavation cost $31,536 36, at the contract prices.

The following statement will shew the additional cost for completing the work.

For grading, bridges, &c. including superintendence and all charges, forty-one miles and one fourth of rail-way bed, in addition to what has been done,	$320,000 00
For laying a single track-way, on eighty-one miles and three fourths, on the best plan, and in the best manner, at $5,500 per mile,	449,625 00
2 steam engines, of forty-five horse power, each, with buildings, ropes, &c.	15,000 00
	$784,625 00
If a double tract be laid, add	449,625 00
	$1,234,250 00

The grading, bridging and forming the rail-way bed throughout the whole line, from Columbia to Philadelphia, can be completed in the year 1831, and forty miles of the rail-way can be laid for use by the 1st of June, 1832; the remainder by December, of the same year.

The mechanical and other work on this division, appear to be executed in the best style.

The largest bridge on the line of the rail-way, is that over the Conestogo, near Lancaster. It is built on Town's lattice plan, is fourteen hundred feet long, has twenty-two feet width of platform. Its abutments and piers are composed of excellent rubble masonry laid in mortar. There are ten piers; the highest of these is sixty feet. In the piers and abutments, there are eight thousand three hundred and twelve perches of masonry. The materials in the superstructure are all prime, and the work does credit to the contractors. The bridge is of great strength, it is roofed and weather boarded. The whole cost of this work was only thirty-one thousand, six hundred and fifty-two dollars.

An arch bridge has been built over Little Conestogo, on Burr's plan. This work has been faithfully constructed, and is a beautiful specimen of bridge architecture. The bridge is eight hundred and four feet long, contains three thousand, three hundred and twenty-six perches of masonry, is roofed and weather boarded, yet the cost when completed, was but fifteen thousand three hundred and fifty-nine dollars. The highest pier in this bridge is forty-seven feet. There are five piers.

The eastern division of the Pennsylvania canal, commences at the point of connexion of the Pennsylvania rail-way, with the canal basin at Columbia, and runs through the counties of Lancaster and Dauphin, along the eastern side of the Susquehanna river, to a point opposite Duncan's island; then crosses the Susquehanna by a towing path bridge, and terminates at the outlet lock of the Susquehanna division, at Duncan's island. The whole length of this division, by the towing path, from the foot of the basin at Columbia, to the outlet lock at the island, is forty-two miles and eighty-five hundredths of a mile.

About thirty five miles of the division passes through a country highly favourable for the construction of a canal. The river bottoms are wide, and admit of the adoption of any level desired. The excavation in general is easy, and the materials for banks good. About eight miles may be termed difficult, and part of it, judging by the expense, extremely so. Th ee hundred and fifty-one thousand dollars, were expended in constructing about three miles and a half of the prism of the canal, exclusive of mechanical and other work.

The width of the canal on this division is twenty-eighty feet at bottom—forty feet at top water line—the depth four feet.

The top water line of the basin, in which the Pennsylvania and Union canals unite, at Middletown, is fifty-two feet and a half above that of the basin at Columbia, and two hundred and ninety feet above tide. The top water of the large basin at Harrisburg is three hundred and twelve feet, and the surface line of the pool around Duncan's Island, three hundred and thirty-two feet, respectively, above tide. The floor of the vestibule of the state capitol is three hundred and sixty feet above tide.

The twenty-four miles of this division, lying between the Swatara and Duncan's Island, was the first line of state canal placed under contract, and has been for some time in navigable use.

On these twenty-four miles there are six lift locks on the main line. One lock of three feet, leading from the main line to the basin at Middletown, and two locks leading from said basin into the Swatara river, having each nine feet lift.

The original estimated cost of these twenty-four miles, made in 1826, was four hundred and five thousand five hundred and eleven dollars. The first contracts are dated in June, 1826. The ground was broken July 4th, 1826.

It is now ascertained that the whole cost of these twenty-four miles, inclusive of damages, has been eight hundred and thirty-two thousand and thirty-six dollars and sixteen cents.

The following statement exhibits the principal works, and their cost.

Cost of constructing the sections.

Excavation and embankment, &c. including a basin at Middletown,	$273,968 24	
196,019 perches of vertical wall,	133,674 38	
		407,642 62

4¼ miles of turnpike road on the whole division.	22,000 00
11 locks cost.	132,721 91
These locks are constructed of cut stone, and are seventeen feet in width and ninety feet in length, clear, in the chambers.	
A feeder dam across the Susquehanna, at Duncan's Island.	
The old dam consisted of a line of loose stone, extending across the stream, which, together with the sluice, and including six thousand and eighty-seven dollars and one cent and a half, paid in repairing, cost,	29,799 16
The new dam is one thousand nine hundred and ninety-eight feet long, between the sluice wall and the abutment on Duncan's Island. The dam is eight feet and a half high, from the bed of the river. It has a base of thirty feet, and is composed of strong timbers, cribbed together and filled with thirteen thousand perches of stone, well packed, and covered with large timbers, thirty-five feet long. The upper end of the timbers are covered with stone four feet above the foundation. This work cost,	18,421 60
The stone of the old dam were used for filling and covering.	
The western abutment contains six hundred and ninety-eight perches of masonry, laid in mortar, and together with its guard bank, cost,	2,759 50
This dam was completed for use in eighty-five days from the day of contract.	
4 aqueducts—the longest one hundred and twelve feet, the shortest eighty-one feet; the whole length between the abutments is three hundred and seventy-three feet, width from eighteen to twenty feet,	43,724 09
The piers and abutments of cut stone and rubble masonry, the superstructure partly stone and partly wood.	
12 culverts, stone, whole span sixty eight feet,	14,641 51
6 waste wiers, whole overfall two hundred and fifty-one feet,	2,716 37
5 water ways,	1,250 00
7 lock houses,	2,997 69
13 road and 34 farm bridges, stone abutments, superstructure wood,	41,915 68
1 basin at Harrisburg, of three acres and a half	8,699 35
The fencing cost about	14,000 00
Incidental expenses of the whole division,	2,193 19
Engineers, superintendents, &c. of the whole division,	33,193 19

Repairs to the 10th of June 1830,	27,212 44
Miscellaneous, on the whole division,	18,731 97½
Damages paid on the whole division,	12,425 54
	$832,036 16½

Of the remaining eighteen miles and seven-eighths of this division, ten miles were authorized to be placed under contract, and the most difficult parts were selected. The original estimated cost of the ten miles placed under contract, made in 1828, was two hundred and forty thousand eight hundred and fifty-five dollars. These ten miles are nearly completed.

The works and cost, when finished, will be as follows:

Sections—Excavation and embankment	$ 185,068 97	
One hundred thirty-eight thousand four hundred and eighty-six perches of vertical wall,	135,989 63	
Forty four thousand nine hundred and fifty-eight perches of rip rap wall, for foundation, and five thousand one hundred and ninety yards of inside wall,	22,619 15	
		$ 343,677 75
6 lift locks,		30,812 00
8 aqueducts—whole length two hundred and seventy feet, width, from twenty to twenty-eight feet,		7,991 40
4 culverts of stone—whole span twenty-eight feet,		2,136 75
2 waste wiers—whole overfall one hundred feet,		700 00
6 water ways,		4,200 00
6 lock houses,		1,800 00
Bridges—three road and five farm,		5,458 49
1 basin at Columbia, say		3,000 00
1 culvert at Haldeman's mill,		1,200 00
Fencing, about		2,277 23
Add for expenses,		2,211 74
Amount of work not yet included in final reports,		46,232 04
		451,697 30
Cost of twenty-four miles above Middletown,		832,036 16
		$ 1,283,733 46

The eight miles and seven eighths, not under contract, will require the following works, viz:

Sections—Excavation, embankment, &c.	$ 54,000 00
Aqueduct over the Swatara, two hundred and fifty feet from abutment to abutment,	25,000 00
Stone abutments and piers, and superstructure of wood.	

2 locks of eight feet lift each; 2 lock houses,	13,400 00
4 culverts, whole span twenty-four feet,	1,600 00
3 waste wiers and 2 water ways,	1,500 00
19 bridges,	8,560 00
12 miles of fencing, at three hundred and sixty dollars per mile,	4,320 00
Engineers, superintendents, &c.	3,000 000
Add contingencies,	5,000 00
	$ 116,170 00

The whole work is remarkably easy of construction, and if authorized by the 1st of March, can be finished for use by the first of September next, at an expense, including superintendence, and all other changes, not exceeding one hundred and sixteen thousand dollars. Fifteen lock keepers required on the whole divsion.

THE SCHUYLKILL CANAL

Belongs to an incorporated company. It commences at Fairmount, near Philadelphia, and runs to Port Carbon, in Schuylkill county.

The distance from tide to the point at which the Union canal commences is sixty miles. The rise or lockage to the said point is one hundred and eighty-two feet and one fourth, from mean high tide in the Schuylkill. On this part of the canal there are thirty-four lift, guard and outlet locks. This canal leads to the coal beds in Schuylkill county. It is one hundred and ten miles in length, was the first canal carried into successful operation in the state, and does credit to the enterprize and public spirit of the stockholders. It has cost about two millions of dollars.

THE UNION CANAL

Is the property of an incorporated company. It commences in the Schuylkill canal near Flying Hill Run, extends to Middletown, and connects with the Pennsylvania canal in a basin at that place. The whole lengh of this canal is eighty miles. The rise or lockage from the point of separation from the Schuylkill canal to the summit level is three hundred feet. The fall to the topwater in the basin at Middletown is one hundred and ninety-two feet and an half. On this canal there are ninety-two lift and two guard locks.

Through these canals and the Pennsylvania canal a communication is now established from Philadelphia to Wilkesbarre, and also to Huntingdon.

A very considerable increase of business will shortly take place on these canals, in consequence of the completion of a material part of the Pennsylvania canal, with which these connect.

The great expenditures which the Schuylkill and Union canal companies have made has effected much for the benefit of the public, and in all reasonable matters they are entitled to public protection and favorable consideration.

These canals are here brought into view from their close connection with the eastern division of the Pennsylvania canal; and

from the fact of their forming a part of an entire line of communication from Philadelphia to Huntingdon, and from Philadelphia with the canal along the Susquehanna and its branches.

JUNIATA DIVISION.

From the outlet lock at the end of the eastern division, to the point on Duncan's island at which the Juniata division commences, the distance is one mile and fifty-eight hundredths of a mile. The rise from the surface line of the pool in the Susquehanna at the outlet to the topwater line at the commencement of the Juniata division, is twenty feet nine inches. This portion of the canal forms part of the Susquehanna division.

The Juniata division commences on Duncan's island in the county of Dauphin, and runs through the counties of Perry, Mifflin and Huntingdon, to a point one fourth of a mile above the town of Huntingdon. The whole length of the division, by the towing path, is eighty-nine miles. The topwater line at the connexion of the Juniata and Susquehanna divisions, on Duncan's island, is three hundred fifty-two feet and a half above mean high tide at Philadelphia.

Compared with other divisions, a considerable part of this may be classed as difficult. The entire course of the Juniata river lies through a mountainous country. The mountains are of great elevation, their sides steep and rocky; in some cases extending for many miles parallel with the stream; in others their general range intersects the stream, leaving merely a gap for its passage. The margin betwixt the mountains and river is in many places extremely contracted. The banks of the Juniata are generally bold, and are as well calculated for a slack water navigation as any river of the state.

About fifty-four miles of the division, may be considered as offering the ordinary facilities, twenty miles as difficult, and fifteen miles as very difficult.

The width of the canal, on the Juniata, is twenty-eight feet at bottom, forty feet at top water line, and it has four feet of depth. In its course there are thirty-five lift locks, three guard locks, one out-let and four river locks. The lift locks are fifteen feet by ninety feet clear in the chambers. The lockage or rise from canal top water, at the point of separation of the Juniata and Susquehanna divisions, to the top water of the level above Huntingdon, is two hundred and fifty-one feet and a half. The top water of the canal at Huntingdon, is six hundred four feet and three inches above tide.

The original estimates for constructing this division, were seventeen hundred and forty-one thousand five hundred and eight dollars. The first contracts were made in August, 1827.

It is now ascertained that the actual cost of the division, including thirteen thousand five hundred and sixty-four dollars, paid as damages to property, will be two millions four hundred and ninety thousand two hundred and ninety dollars.

The following is an exhibit of the principal works and their cost:

Cost of constructing the sections, excavation, embankment, &c., from Duncan's island to Lewistown,	$686,928 40½	
From Lewistown to Huntingdon,	846,708 54½	
		1,533,636 95
1 out-let lock at Lewistown, constructed of wood,		7,542 79
1 guard lock at North's island, of wood,		3,985 00
1 guard lock at Raystown,		8,230 14½
1 guard lock at Aughwick falls,		13,157 14
55 lift locks—Of these, three are constructed of cut stone, five of rubble masonry, one combined with a stone aqueduct, and twenty-six constructed of rubble masonry, laid in mortar, on timber bottom with longitudinal sills and upright posts, faced with plank spiked to the timbers,		203,246 78
4 dams—The whole length between their abutments is about two thousand two hundred and fifty feet, height from eight to nine feet. Their cost, including four river locks, and one schute and sluices,		90,870 91
Pier heads,		7,804 14
19 aqueducts—Their whole length is twenty-eight hundred and ninety-seven feet; the longest six hundred feet, the shortest twenty-six feet, width generally eighteen feet, stone abutments and piers, superstructure of wood,		245,351 04
One of these aqueducts built over Buffaloe creek, is formed of cast iron, covered with iron plates and floored with cut stone, laid in cement.		
25 waste wiers,		13,453 34
60 culverts—Whole span, three hundred and forty-six feet, rubble masonry in mortar,		61,799 16½
39 road, 63 farm, and 5 towing path bridges, exclusive of embankment,		40,436 53
Roads—Seven miles and a half of turnpike, and fourteen miles and three fourths of township roads,		60,745 18½
Fences—At eighty cents per panel of ten feet,		21,597 71
29 lock houses,		20,371 64
Castings,		3,879 58
Rope ferry,		8,086 79½
Repairs,		69,355 18½
Contingent expenses—Target, levels, rent, &c.		3,880 60½
Engineering,		51,388 25
Superintendents, &c.		8,107 00
Damages paid,		13,564 31½
		$2,490,290 13½

30 lock keepers required.

That part of the division above Lewistown, into which the water has been recently admitted, proves to be excellent canal.

The proposed canal and slack water, along the Juniata, above Huntingdon, may extend from the head of the canal at that town, to the head of the basin at Hollidaysburg, as arranged by Moncure Robinson. The whole length of the division, will be thirty-nine miles; all within the county of Huntingdon.

A considerable part of the country through which this division must pass, partakes of the mountainous character of the lower Juniata. The river bottoms are contracted, the banks are high, bold and rocky; the stream narrow, its fall averages eight feet per mile.

It is obvious from this general character, that a great saving may be made by converting the most difficult parts of the line into a slack water navigation of the river bed, by means of high dams. These may be so arranged as to save many miles of canal, along the most difficult parts of the shore, and this will greatly diminish the general cost.

Should a canal be constructed only along parts of the division, where the ground is favorable, it is clear, that the proportion of excavation, embankment, &c. will be much less than if a canal were extended through the whole line.

The dams may be so arranged, that no acqueducts will be required. A large saving will also be made by the diminished number of bridges, culverts, waste wiers, as also in the quantity of wall, fence, road, &c. It is obvious too, that the whole work can be completed in much less time than by constructing a canal through the whole line. Objections cannot be fairly made to the erection of these dams, as the river bed above Huntingdon, is but little used for navigation.

The communication by canal and slack water between Huntingdon and Hollidaysburg, can be completed by the 1st of May, 1832; provided the legislature authorize the work as early as the 1st of March, 1831.

The cost of the proposed slack water and canal communication, may be fairly estimated at $546,000.

The whole rise and lockage from top water of the canal levels, at Huntingdon, to top water of the basin, at Hollidaysburg, is three hundred and twenty-three feet nine inches. The water surface of the basin, proposed at Hollidaysburg, is nine hundred and twenty-eight feet above mean high tide.

Having through the Schuylkill, Union and Pennsylvania canal, or by the Pennsylvania rail-way and canal reached Huntingdon, and passed along the course by which a water communication can be advantageously extended to Hollidaysburg, the Allegheny now presents its formidable outline.

Destined to separate the great waters of the east and west, this mountain bids defiance to all the efforts of art to connect the water navigation which has been so successfully arranged to its eas-

tern and western base. Man it seems may disturb and modify the mere incidental arrangements of nature;—her mighty laws and works must still prevail. We are therefore, here forced to find some other means, by which to cross this great barrier, than that of a water communication.

Standing on the level of the water line of the basin at Hollidaysburg, nine hundred and twenty-eight feet above mean high tide, and two hundred and twenty-three feet below the level of the canal basin at Johnstown, on the opposite side of the Allegheny mountain, and looking in the direction of the head of the basin, at that place, a direct line strikes the comb of the mountain at Blair's Run Gap summit, three miles south of the present turnpike road. This summit is one thousand six hundred and sixty-nine feet above the level of the basin at Hollidaysburg. On the left of this summit are Bob's Creek Gap, one thousand five hundred and seventy-eight feet high; and farther to the left Cedar Swamp summit, one thousand five hundred and thirty-two feet high. On the right Laurel run summit, one thousand five hundred and eighty-seven feet. Adams' Run, one thousand five hundred and forty-nine feet. Blairs' Gap, one thousand four hundred and fourteen feet. Sugar Run, one thousand three hundred and sixty-five feet, respectively, above the basin at Hollidaysburg. The last mentioned summit is about one mile and a half north of the turnpike. The tunnel proposed by Moncure Robinson, is one mile north of the turnpike, one mile in length, and one thousand two hundred and sixty-four feet, and sixty hundredths of a foot above the basin at Hollidaysburg, and the comb of the mountain immediately over the tunnel, is one thousand four hundred and forty one feet and sixty hundredths above said basin.

It appears, that, to pass the lowest depression of the mountain, within the range of the portage, one thousand three hundred and sixty-five feet of elevation must be overcome, on the eastern side, in about ten miles and a half to the crest; and that the descent from that point to the canal basin at Johnstown, is one thousand one hundred and forty-two feet. The distance about twenty-seven miles and a half.

To expedite and cheapen transportation across this portage, many plans have been proposed, and many surveys and examinations have been made. Time, discussion and reflection, have narrowed down these plans, until two only are admitted to be worthy of consideration; the one by means of a Macadamized turnpike; the other by a rail-way. It is satisfactory to know, that the mountain readily admits of the adoption of either plan.

Should a rail-way be deemed the most advisable, on account of the great expedition and cheaper rates at which transportation can be effected, the most eligible plan would seem to be that arranged with spaces of the road graded below one third of a degree, extending as far as conveniently practicable, and terminating with an inclined plane of about half a mile in length, rising at a grade not exceeding five degrees. A steam engine, of forty horse power,

to be stationed at the head of such plane, to draw up the loading, brought to its foot by horse or other power, and thus alternately until the whole elevation of the mountain is overcome. In this manner, nine or ten steam engines and a small number of horses, could pass five hundred tons from basin to basin, in each direction, in a day of eleven hours, at a very moderate expense.

The extensive demand for fuel, in the city of New York, and its high price, induced a number of enterprizing citizens to attempt to arrange an advantageous communication, by which to transport coal from Carbondale, in Pennsylvania, to that populous city. After much labour and expense, success attended the enterprize.

This line of communication is by the Hudson river to Kingston, ninety miles; thence by a canal through the state of New York, to Honesdale, in Pennsylvania, one hundred and four miles; and from this point by a rail-way of sixteen miles, to the coal mines on the Lackawannock, in Luzerne county. The whole distance from New York city to Carbondale, is two hundred and ten miles.

In passing from the coal mines, at Carbondale, to the top of the mountain between that place and the head of the canal, it is necessary to overcome an elevation of eight hundred and fifty-five feet in four miles, and to descend nine hundred and thirteen feet to Honesdale. The greater part of this elevation, is overcome by five stationary engines, each acting at the head of an inclined plane, of about half a mile in length, and having an elevation of about one hundred and eighty-five feet to the half mile.

To satisfy themselves, as to the actual practical results of stationary steam power, acting on inclined planes, the members of the board, in the course of their travel, visited the rail-way at Carbondale, so that by their own personal inspection, they might know how far the proposed application of stationary steam power, connected with a system of inclined planes and levels, might be beneficially applied to overcome the great elevation of the Allegheny mountain, between the heads of the Pennsylvania canal.

The board wished also, to be enabled to judge of the practical results which might be expected, on the Susquehanna and Schuylkill planes, of the Columbia and Philadelphia rail-way.

At the time the commissioners visited the Carbondale rail-way, the mining operations of the coal company did not enable them to present for transportation, more than two hundred and fifty tons per day. This quantity, was daily conveyed across the mountain. The operations of the stationary engines, were carefully noted, and in the ordinary routine of business, it was observed, that seven tons and a half of coal contained in three cars, the whole weighing ten tons, was conveyed from foot to head of each plane, at an average of eight minutes, and that only eleven minutes elapsed from the time the machinery was attached to one train of cars, to the time these were passed on, and another train was attached. Consequently, the machinery was capable, by steady operation, (and machinery never tires) to pass, in the day of twelve

hours near five hundred tons of coal. The engines are thirty-five horse power, and the whole cost to the company, for each engine, including attendance, fuel, and all charges, is six dollars and forty-two cents per day.

The company by contract, and at a profit, convey merchandize across the sixteen miles for thirty-five cents per ton, exclusive of toll.

The whole elevation and descent, to be overcome on the Moosic mountain, between Carbondale and Honesdale, is one thousand, seven hundred and sixty-eight feet, in a distance of sixteen miles. That from the basin at Hollidaysburg to Johnstown, taking the lowest depression of the mountain, is two thousand five hundred and seven feet in a distance of thirty-eight miles. The elevation of the Moosic mountain, is therefore, nearly equal to three fourths of that of the Allegheny, yet, the first named mountain is overcome, through the means and arrangements of merely an incorporated company; surely, then the most wealthy and powerful state of the Union, is competent to establish and maintain the arrangements necessary to overcome the difficulty on the Allegheny.

Should the legislature determine to adopt the plan of a rail-way across the Allegheny, dispensing with the tunnel, the cost may be fairly stated as follows:

For grading, bridging and finishing the rail-way bed, for a double track-way, including all expenses, say thirty-eight miles, at $9 000 per mile,	$342,000	00
For a single track-way, at $5,300 per mile, laid in the best manner, and including all expenses,	201,400	00
Steam engines, ropes, buildings, &c.	60,000	00
	603,400	00
If an addditional track be laid after the first is completed, it will cost $5,000 per mile,	190,000	00
	$793,400	00

Should it be determined to adopt a Macadamized turnpike, for the present, the road may be graded as has been herein proposed, and teams can be doubled on the planes, and a rail way can, at a subsequent period, be laid upon the bed of this road.

The report of Moncure Robinson in 1829, and of the engineers appointed under the act of 27th March last, is referred to for further information upon the subject of the portage.

The western division of the Pennsylvania canal will unite with the proposed portage, across the Allegheny mountain, at an extensive basin arranged at Johnstown, in the county of Cambria, with a view to such connexion. The head of the division is at the basin mentioned, from whence the canal runs through the counties of Cambria, Indiana, Westmoreland, Armstrong, Butler and Allegheny, and terminates in the Monongahela river at Pittsburg.

A branch terminates in the Allegheny river, at the town of Allegheny.

A very considerable part of this division presents difficulties in the construction of a canal, especially between Johnstown and Blairsville. The sides of the gaps through the Laurel Mountain and Chesnut Ridge are rocky, precipitous and of great elevation; a passage is barely afforded to the stream. The river hills through the whole extent of the canal are high, steep and liable to slip.

About sixty-four miles of the division may be classed as affording the ordinary facilities for the construction of canal, twenty miles as difficult, and twenty miles as very difficult. Ten miles of the very difficult lies above, and ten miles below Blairsville.

The Conemaugh and Kiskiminitas throughout their whole course from Johnstown to the Allegheny river, a distance of seventy-four miles, are narrow streams, with high, steep banks, well adapted for slack water navigation. There is on the division about twenty-seven miles of slack water, and it would have been advantageous, had the proportion to that of canal been greater.

On the thirty miles of canal between Johnstown and Blairsville, the average fall of the river is upwards of eight feet per mile, requiring equal to one lock per mile. Below Blairsville to the Monongahela, the fall is but three feet per mile, requiring equal one lock to two miles and a half.

The law of 1823, authorizing the commencement of the western division of the Pennsylvania canal, directed the construction of the canal "from Pittsburg to the mouth of the Kiskiminitas," both of which points are on the east side of the Allegheny river. It is evident that a great error was committed in locating the canal on the western side of the Allegheny; as the navigation of the canal is necessarily dependent on the permanency of the aqueducts across that river. These aqueducts are of feeble construction and their arches of great span.

On the commissioners visiting and inspecting the older part of the division between Blairsville and Pittsburg, it was obvious to them all, that extensive repairs, to remedy the original defects of the work, were necessary, before a secure navigation could be expected; and it was concluded that it was better to interrupt the navigation during the present year than afterwards.

The commissioners, therefore, passed the following resolution:

"Resolved unanimously, as the board are convinced by personal inspection of the western division of the Pennsylvania canal, that immediate and extensive alterations and repairs of the canal between Blairsville and Pittsburg are necessary, to correct the errors of its original construction, and to secure the works and enable the the canal to bear the depth of water contemplated at its commencement: that the supervisors on their respective portions of said line, be and they are hereby directed to draw off the water from the canal on Monday the 16th day of August next, and that they take immediate measures to make, with all practicable expedition, such repairs, &c. of the canal, locks, dams, culverts, aqueducts, &c. as

by the engineer, on the western division, shall be designated as necessary to the security and complete navigation of said line, and as he may think it practicable to effect, so as to again admit the water into the canal by the 20th day of October next."

The agents on the division acted with great energy, and within the time prescribed, effected the most essential repairs. Several of the locks have been rebuilt entire, and others partially so, several culverts have been rebuilt. the aqueducts have been repaired and strengthened, the dams, &c. have also been repaired, and it is hoped rendered secure. The commissioners are satisfied that all was effected that it was possible toeffect within the time allowed.

The sum expended in making the necessary repairs has been considerable, but the amount is moderate, when the extent of work done is taken into view. The part of this division repaired is now in good navigable order.

The act of 28th March, 1830, authorized the construction of that part of the western division leading from section No. 57, of the Ligonier line, to a suitable point for the connexion of the portage road and the canal at Johnstown. The distance from the head of the basin, at Johnstown, to section No. 57, of the Ligonier line, is three miles and a half.

The estimated cost of this work, made by Sylvester Welsh, the principal engineer on the division, in April, 1830, was seventy thousand one hundred dollars.

The actual cost completed, is sixty four thousand two hundred and fifty five dollars.

The following are the principal works, and their cost:

Sections—including two thousand and eighty-nine perches of wall,	$18,192 31
1 basin, of eight acres and and a half, and a towing path of one thousand four hundred and seventy feet,	1,693 28
3 locks, of cut stone masonry, laid in hydraulic cement, Built in the best style, and including lock sections.	13,751 85
1 aqueduct—length of trunk forty-five feet, width eighteen feet, stone abutments, superstructure wood,	3,720 00
1 aqueduct over the Conemaugh river—two spans, length of trunk one hundred and sixty-three feet, width seventeen feet. Piers and abutments contain one thousand eight hundred and eighty-five perches of cut stone masonry, laid in cement—also, one hundred and sixty one thousand feet, board measure, of timber, and six thousand five hundred pounds of iron; the structure is roofed and weather-boarded,	13,050 00
5 culverts, whole span twenty feet,	2,660 00
2 waste wiers, one hundred feet,	360 00

1 dam across the Conemaugh, one hundred and forty feet long, six feet high, stone abutments, crib work, filled with stone and sheeted,	1,219 00
1 guard bank, four hundred and five feet long, top twelve feet wide and seventeen feet and a half above the bottom of the canal,	537 00
1 water way forty-three feet long, thirteen feet high, four gates—one hundred and forty-one perches of masonry,	$ 1,158 45½
3 lock houses,	1,165 00
Fencing required,	805 00
Roads,	282 00
1 dam and waste wier connected, one hundred feet long and eleven feet high,	1,539 84
2 road and one farm bridges—fifty feet span and eighteen feet wide—stone abutments, superstructure of wood, trussed with iron,	2,240 00
3 water ways around locks,	1,245 46
Add proportion of expenses of engineers, superintendent's pay, and all other charges, for ten months,	630 24
	$ 64,255 00

The work was completed and navigated within seven months of the day of first letting and contract.

The work on that part of the Ligonier line, extending from section No. 57, to Blairsville, about twenty-six miles and a half in length, was commenced in the beginning of the year 1829.

The original estimated cost, made in November, 1828, for this part of the line, and subsequent to the letting in the fall of 1828, was four hundred and fifty-two thousand five hundred and seventy eight dollars and thirty-one cents. The estimate made by Mr. Welsh on his becoming principal engineer in 1829, and reported in November of that year, was six hundred and forty-one thousand seven hundred and thirty-two dollars and seventeen cents.

The actual cost of this part of the line, completed, will be six hundred and forty-four thousand one hundred and seventy-eight dollars and seventy-four cents.

The following is a statement of the principal works on this part of the line, and their respective costs:

Sections—excavation, embankment, &c.		$ 242,398 49
Slope walls, not included in the cost of sections,		5,897 14
Lock sections, guard and lift,		14,228 07½
4 guard locks,	Cut stone, laid in cement,	26,802 98
27 lift locks,		161,798 12

Aqueducts—One of seventy five feet in length and nineteen feet in width, constructed of cut stone, arches, abutments and piers,	$ 13,184 00	
One at Laurel Run, forty-five feet long, eighteen feet wide, stone abutments, superstructure of wood, trussed with iron,	3,925 00	
One at Lockport, cut stone abutments, piers, arches and trunk. In the work there are five arches and contains eight thousand six hundred perches of masonry in mortar—whole length three hundred and eighty-three feet, width of trunk nineteen feet,	57,100 00	
		74,209 00
4 dams—whole length one thousand five hundred and sixty-seven feet, whole height fifty nine feet and a half, crib work filled with stone, covered with timber and gravelled,	39,187 45	
Dam abutments of stone masonry,	8,660 21	
4 dam sections,	4,122 87	
Pier heads,	3,634 45	
		55,604 98
27 water ways or sluices, around locks,		8,201 74
8 culverts—stone masonry laid in cement, built in the best style and carefully secured, whole span about seventy feet,		9,112 20
11 waste wiers, entire span about five hundred and eighty feet,		5,733 55
28 lock houses,		10,663 00
Fencing,		3,429 93
Roads,		727 33
Puddling, not included in other contracts,		2,308 30½
Bridges—twelve road, eleven farm and six towing-path bridges. The road bridges have stone abutments, the superstructures strong truss-work, and extending the full width of the canal.		11,063 83
Contingencies—superintendence, engineers, stationary, &c.		12,000 00
		$ 644,178 74

The new line from Blairsville to Johnstown was so far completed that it was opened for navigation in the month of November, to within a few miles of Johnstown. The water has been admitted

from the head of the basin through the three miles and a half of canal, authorized the 28th of March last, and placed under contract the 10th of May. Having been completed for regular navigation within seven months from the day of contract, although an unusually large proportion of mechanical work was necessary on the line. Packet boats passed up to Johnstown and returned on the 10th of December. The whole line proves to be excellent canal; not one breach has occurred since it was filled for navigation. The report of the engineers and superintendent on the division are referred to for details.

That part of the western division which extends from Blairsville to the Allegheny river, was estimated in November, 1827, to cost four hundred seventy four thousand seven hundred dollars. The actual cost, completed, exclusive of repairs, made since the first of June last, will be one million fifty five thousand four hundred eighty three dollars and ninety-seven cents.

The original estimates of the cost of that part of the division from the mouth of the Kiskiminitas to Pittsburg, taking the course the canal runs and including two aqueducts over the Allegheny and the line extending through Pittsburg to Monongahela river and the branch to the town of Allegheny, was five hundred and twenty three thousand seven hundred and ninety-six dollars and eighty cents. The actual cost, completed, exclusive of repairs made since the first of June last, will amount to nine hundred and ninety-five thousand dollars.

The original estimates for the whole western division amounted to fourteen hundred and ninety-eight thousand nine hundred and ten dollars and ten cents. The actual cost, completed, will be, including repairs to the last day of the present year, about two millions eight hundred thousand dollars.

THE SUSQUEHANNA DIVISION.

Commences at the termination of the eastern division, at the outlet lock at Duncan's island, and runs along the west side of the Susquehanna river, through the counties of Perry, Mifflin, and Union, and terminates at the south end of the towing path bridge at Northumberland. The whole length of the division, measured by the towing path bank, is thirty-nine miles.

The country through which this canal passes is favorable for a canal. The bottoms are wide and gently sloping to the river, giving the choice of level; few obstacles present themselves. The excavation is easy and material for banks good. Not more than four miles of the division presents any difficulties, and these not great.

The original estimate for constructing this division, was five hundred and ninety-eight thousand three hundred and seventy-six dollars and thirty-two cents.

It is now ascertained that the actual cost of this division, is one million thirty-nine thousand two hundred and fifty-six dollars and seventy-seven cents, inclusive of the bridge over the Susquehanna river.

The canal is in navigable order.

The whole amount of lockage on this division, from the surface line of the pool round Duncan's island, to the surface line of the pool at Northumberland, is eighty-six feet and a half. The surface of the pool at Northumberland, is four hundred and eighteen feet above tide.

Cost of constructing the sections, excavation, embankment, &c.		$545,232 41
Wall,		7,897 93
11 locks,		107,398 43
Dam at Shamokin—first cost,	$21,434 08	
Repairs,	28,385 73	
Schute,	11,467 46	
Extending the schute,	2,960 00	
		64,217 27
3 aqueducts,		15,443 76
15 waste wiers,		2,464 94
26 culverts,		18,814 92
Road and farm bridges,		89,505 88
Towing path bridge over Susquehanna at Duncan's island, which was built under the superintendent of the Susquehanna division,		$73,454 85
Ice breakers above said towing path bridge,		2,050 90
Roads,		3,962 03
Fences,		16,515 46
10 lock houses,		7,422 70
Dam at Snyder's mill, on Penns creek,		8,194 62
Ditto, on section No. 26,		532 80
Feeders,		9,121 04
Mound,		13,993 51
Basin and lock, on section No. 1,		4,899 32
Repairs,		1,085 54
Contingent expenses, paid attorney's fees,		300 00
Damages paid,		1,437 50
Miscellaneous expenses,		19,784 27½
Engineers, superintendents, &c.		31,027 18
		$1,039,256 77½

THE WEST BRANCH DIVISION,

Of the Pennsylvania canal, commences at the south end of the towing path bridge across the western arm of the Susquehanna, at Northumberland, and runs along the east side of the stream, through the county of Northumberland, to the feeder dam at Muncy Hill, a distance of twenty-three miles and one quarter. The towing path extends along the pool some distance farther, making the whole length of navigation, twenty-four miles and a half.

No part of this division can be classed as difficult. The river bottoms are very wide, their slopes gradual, the lands generally cleared, very little rock is met with. The soil is sandy loam and

gravel, of course the excavation easy, the lockage is very inconsiderable.

The width of the canal at bottom, is twenty-eight feet, forty feet at top water line, the depth four feet. In its course there are six lift locks, and one guard lock, all constructed of wood and stone, they are seventeen feet wide, by ninety feet long, clear, in the chambers. Seven lock-keepers will be necessary.

The whole rise and lockage from the surface line of the Shamokin pool, at Northumberland, to the surface line of the pool, at Muncy, is forty-one feet. The comb of Muncy dam is one foot above canal level at the guard lock, and nine feet above low water in the river below the dam. The pool extends above two miles.

The original estimated cost for the construction of this branch of the canal, made in August 1828, was one hundred and ninety-seven thousand, eight hundred and fifty one dollars.

The canal was filled for navigation in November, 1830.

The actual cost of this division, excluding damages to land, is now found to be four hundred and twenty one thousand, seven hundred and seventy-one dollars.

The following is a statement of the principal works, and their cost:

Sections, including excavation, embankments, &c. and 33,464 perches of wall,	$188,827 53
Towing path round Muncy hill,	15,369 06
Slope walls at locks, &c.	1,957 27
7 lift locks, one guard lock and iron wicket gates,	38,506 00
The locks are constructed of wood and stone, dry walls of rough stone, are laid and planked in the bottom and sides, to timber, secure to the walls by iron bolts.	
Cost of the feeder dam across the Susquehanna, at Muncy ripples,	23,578 64
The dam at Muncy, constructed of crib work, filled with stone, covered with spars, the space between the stone abutments is nine hundred and seventy-three feet, the wier of the dam is eight hundred and sixty-three feet, the schute thirty-eight feet, the height of the comb of the dam is nine feet, and the comb of the schute five feet above low water mark of the river.—The dam is twelve feet high from the bottom of the river.	
1 aqueduct over Chillisquaque creek. Length between the abutments, one hundred and sixty feet, abutment and piers rubble masonry, superstructure wood, cost	5,086 36
15 culverts, constructed of stone, whole span eighty-six feet,	15,520 45
5 waste wiers, whole overfall two hundred and fifty feet, cost	1,947 00

6 lock houses,	1,980 00
Basin at Northumberland, cost	1,854 40
Paid for making roads,	2,113 62
Towing path bridge at Northumberland—length between abutments, one thousand two hundred and ninety feet, stone abutments and piers, superstructure wood, cost	57,490 51
35 farm and 14 road bridges, cost	23,984 28
33 miles of fencing,	10,928 41
Repairs,	4,886 65
Contingent expenses,	2,945 38
Engineers,	15,553 25
Superintendents, clerks, &c.	5,265 90
Real estate,	575 00
Damages paid,	1,401 44
	$421,771 00

THE NORTH BRANCH DIVISION

Of the Pennsylvania canal, commences at the canal basin, in the town of Northumberland, and runs a northeasterly course, along the northern bank of the Susquehanna, through the counties of Northumberland, Columbia and Luzerne, to the entrance of the Wyoming valley.

The whole length of the division, from the point at which it intersects the west branch, in the basin at Northumberland, measured by the towing path bank to the feeder dam, at Nanticoke falls, is fifty-five miles and a half.

The country through which this division is formed, is generally highly favorable for the construction of the canal. Not more than eight miles can be classed as difficult. The river bottoms are generally wide, and the excavation easy. The material for banks good.

The width of the canal, at bottom, is twenty-eight feet, water line forty feet, depth of water four feet. In its course, there are seven lift and one guard locks, constructed of wood, width seventeen feet, length ninety feet, clear, in the chambers.

The rise from the top water line in the basin, at Northumberland, to the surface line of the pool, at Nanticoke, is sixty-eight feet and eighty-nine hundredths. The comb of the feeder dam at Nanticoke, is eight feet and thirty four hundredths above low water in the Susquehanna, and one foot and thirty-four hundredths above four feet water in the canal. The dam carries a pool five miles above it into Wyoming valley, and within two miles and a half of Wilkesbarre.

The original estimate of cost for this division, made in 1828, was four hundred and seven thousand three hundred and thirty-five dollars and thirty cents. The first contracts were made in 1828, the water was admitted in November, 1830; the actual cost of the canal, excluding damages to lands, is now ascertained to be one

million ninety-six thousand one hundred and seventy-eight dollars and thirty-five cents and a half.

The following is a statement of the principal works on the division, and of their respective cost:

Cost of sections, excavation, embankment, &c.	$ 661,456 03	
202,892 perches of outside wall,	125,695 64	
171,270 yards of inside wall,	34,232 63	
		$821,384 30
Cost of one guard and seven lift locks,		32,479 97
Feeder dam across the Susquehanna at Nanticoke falls—crib work filled with stone, covered and gravelled, abutments of rubble masonry, the length between the abutments seven hundred feet, and twelve feet average height from foundation, cost,		29,311 25
Contracted for in 1828, finished for use November 29, 1830.		
5 stone culverts—Their whole span twenty-six feet,	5,262 69	
24 wooden ditto,	2,858 62	
		8,121 31
4 waste wiers and two safety gates, whole length one hundred and thirty-six feet, cost,		6,583 58
(1 more wanted, $500)		
5 aqueducts—Longest one hundred and seventy-two feet, shortest seventy-four feet, length of the whole between the abutments, five hundred and fifty-four feet. The abutments and piers of stone, superstructure wood, width of the trunks from twenty-two to twenty-eight feet,		25,003 02
A towing path bridge forms part of the superstructure.		
8 lock houses,		3,200 00
8 basins—Their aggregate cost about four thousand five hundred dollars, but they were estimated with the sections; they are about three hundred feet long by one hundred feet wide.		
About six miles of road, cost,		57,978 90
61 farm, 17 road, 1 foot and 2 towing path bridges, cost,		40,241 27
Excluding seventeen thousand four hundred dollars the cost of embankment estimated with the sections.		
26½ miles of fencing,		6,596 62
(25 miles more wanted $6,800)		
Repairs,		6,920 18½
Contingent expenses,		3,403 87
Engineers,		28,094 88
Superintendents and clerk,		3,970 50

Damages,	3,801 25
1 water pipe and syphon,	286 50
Ice breakers wanted,	660 00
Clearing creek,	2,900 94
1 lock house built,	240 00
7 more required.	
Beside the above, fifteen thousand dollars will be required for bridges, lock houses, fencing, &c.	15,000 00
	$1,096,178 84½

8 lock-keepers wanted.

THE DELAWARE DIVISION

Of the Pennsylvania canal, commences at Bristol, on the Delaware river, and runs along that stream through Bucks and Northampton counties, to Easton. The whole length of the division, measured along the towing path bank, from the tide basin at Bristol, to the northern side of the feeder dam across the Lehigh at Easton, is fifty-nine miles and three fourths.

The country along this division, presents about thirty miles of surface extremely favorable for the construction of a canal, about sixteen miles less favorable, and fourteen miles that is difficult, and along a considerable portion of which the river bluffs or cliffs, are high, steep and rocky.

On this division, the width of the canal at bottom is twenty-five feet, at top water line forty feet, and its depth of water five feet. In its course, there are twenty-three lift locks, ranging from six to ten feet lift, also two out-let and two guard locks. The canal and locks are arranged for boats of sixty-seven tons burthen. Eighteen lock-keepers are necessary on this division.

The rise and lockage from mid tide at Bristol, to the level of the comb of the feeder dam across the Lehigh, at Easton, is one hundred and sixty four feet. The comb of the dam is twelve feet above low water in the Delaware, at the out let lock immediately below the dam.

The original estimate for constructing this division, was six hundred and eighty-seven thousand dollars. The first letting took place in October, 1827. The filling the canal for navigation, in its whole course, commenced in October, 1830.

It is now ascertained that the actual cost of the division, exclusive of damages to property, will be one million two hundred and three thousand seven hundred and sixty-five dollars and five cents. The amount of damages paid on this division, prior to the 1st of November, 1830, was thirty-four thousand two hundred sixty-two dollars and sixty-four cents.

The following is a statement of the principal works, and their respective cost.

The stone work of the locks, aqueducts, culverts, bridges, abutments, &c. on this division, is generally rubble masonry.

Cost of constructing the sections, excavation, embankment, &c.	533,986 52
230,191 perches of outside wall, cost,	147,091 54
37,594 perches of inside wall, cost,	34,490 17
Expenditures in making roads, but which, in the engineers estimates, are returned as expenditures for constructing sections. This sum includes the cost of ten thousand perches of stone wall, properly chargeable to the cost of roads,	30,473 54
Cost of 23 lift-locks,	108,715 70
Cost of 2 guard locks and 1 out-let lock,	21,794 30
Tide lock at Bristol,	9,500 00

The lift locks are eleven feet wide and ninety-five feet long, clear, in the chambers, &c. They are constructed of rubble masonry laid in cement, on timber bottoms with longitudinal sills and upright posts, faced with plank spiked to the timbers. The tide lock at Bristol, guard lock at Easton, and the out-let lock into the river Delaware, from the pool at Easton, are twenty-two feet wide by one hundred feet long, clear, in the chambers. The guard lock at New Hope, is eighteen feet by one hundred feet, and affords a communication with the river Delaware.

Feeder dam across Lehigh, at Easton, crib work filled with stone, and gravelled, three hundred and seventeen feet long and twelve feet high,	$ 9,000 00
9 aqueducts, the shortest twenty five feet, the longest one hundred and seventy eight feet between the abutments, length of the whole six hundred and thirty one feet; the abutments and piers are of rubble masonry, the superstructure of wood, trunks twenty feet wide. Towing path bridge forming part of the superstructure,	63,005 98
20 culverts, rubble masonry laid in cement. The span of the whole is one hundred and thirty eight feet,	24,863 63
19 waste wiers, with sluice gates—woodwork with protections of masonry. The whole overfall is one thousand four hundred and forty one feet,	22,783 45
16 lock houses built,	9,200 46
Tide basin of five acres and a half, constructed in the Delaware, and pier at Bristol, nearly finished, estimated lately to cost, when completed,	32,000 00
47 road bridges, stone abutments, superstructure of wood, embankments included,	34,552 34
49 farm bridges, as above,	24,388 78
3 turnpike, and 3 foot bridges,	5,114 96
52 miles fencing along canal,	12,182 13

Paid for alterations and for repairs before supervisors were put on the division,		25,297 88
Incidental expenses, postage, books, paper, &c.		2,441 69
Paid engineers, superintendents and other officers, for surveys,		43,672 04
Cost on one culvert and 15 waste wiers, which were afterwards dispensed with, or the plan of location altered,		2,239 92
2 lock houses and collector's office,	$ 1,350	
Fencing yet required, about twelve miles,	2,920	
A foot bridge ordered,	200	
Water ways around locks,	2,500	
		6,970 00
Add damages already paid,		34,262 64
		$1,238,027 69

THE DELAWARE DIVISION

May be fairly considered as an extension of the Lehigh coal and navigation company's canal; it will therefore be proper to bring this canal into view, in connexion with the Delaware division, more especially as this division must derive its principal business and income from the transportation of coal, which must first pass down the Lehigh canal.

The Delaware division unites in a pool of the Lehigh, at Easton, with the canal owned by the Lehigh coal and navigation company.

The Lehigh canal is of the most substantial character, and does high credit to the enterprize of the company at whose expense it was constructed, and to the science and economy of the engineers and officers who had charge of the work. The canal runs from Easton to Mauch Chunk, a great part of it through an extremely difficult country, having a very large amount of lockage to overcome in its rocky and precipitous course. The canal has forty five feet width at bottom, sixty feet surface, and five feet depth of water. Its locks are twenty two feet wide, and one hundred feet, clear, in the chambers; are calculated for single boats of one hundred and forty tons, or double boats of seventy tons. It is forty six miles long, in which distance there are forty seven lift, and six guard locks, and nine dams. The whole lockage from low water in the Delaware, at Easton, to the head of the canal, at Mauch Chunk, is three hundred and sixty feet and eighty seven hundredths. It was finished for use in June, 1829, about two years after its commencement.

The whole cost of its construction, exclusive of damages paid and rights purchased, was one million three hundred thousand dollars.

Forty-six thousand tons of coal passed through this canal, since April 1st, 1830.

The Morris canal connects with the Delaware river at the Jersey side, directly opposite the junction of the Delaware division and Lehigh canal, and runs across New Jersey to the tide waters in the

bay of New York. This canal is nearly finished, and besides its other business, will be a channel for the transportation of the Lehigh coal to Jersey, and the city of New York. It will no doubt be a line of communication that will create some business on the Delaware division.

Under the provisions of the fourth section of the act making further provisions for canals and roads, passed in March last, F. W. Rawle, engineer on the west branch, was directed to make "a survey, plan and estimate, of a canal and lock communication from the nearest and best point on the west branch canal, to the Susquehanna river, at or near the town of Lewisburg, in Union county." The report of Mr. Rawle is herewith submitted, shewing that the length of said communication will be three thousand four hundred feet, that three locks will be required, also a dam across the west branch; and that the whole work will cost twenty five thousand two hundred and sixty-six dollars and forty nine cents.

The same act directs "a like survey, plan and estimate of a canal and lock communication, from the nearest and best point on the canal, at or near Harrisburg, to the Susquehanna river." The duty was assigned to E. F. Gay, engineer on the eastern division. His report, herewith submitted, shews that the canal will have a length of seven hundred and ninety two feet—two locks, each eight feet lift, and is estimated to cost twenty five thousand eight hundred and eleven dollars and eleven cents.

The board are of the opinion, that the forming of these connexions with the Susquehanna, river will operate advantageously to the canal, and will afford valuable facilities to the citizens of the surrounding country.

The propriety of authorizing the construction of an outlet lock from the eastern division of the Pennsylvania canal into the Susquehanna river at Columbia, is recommended.

Many of the coal and other arks and boats intending to run to the tide water at the mouth of the Susquehanna, will enter the canal from the upper parts of the river, and descend it, provided they can again have admission into the Susquehanna, so as to pursue their destined course. Boats also which have descended the river during a time of favourable water will ascend the canal, provided they can be admitted into it, and a considerable increase of tolls will ensue. This arrangement will be beneficial to the coal trade of the Susquehanna, as well as to other interests, and has been especially recommended to the board as of importance to the citizens of Wyoming valley.

On the subject of extending the Pennsylvania canal system, the board of canal commissioners remark: that the time is not distant when the increasing population of the northern, western and other regions of the commonwealth, will successfully demand the benefit of canals and rail-ways amongst them.

Whether it is at this time within the power of the commonwealth, with due reference to her credit, to meet the interests and desires of such portions of the state as now claim to be embraced within

the range of improvements by canals, will depend on the facts that may present themselves before the legislature, during the present session. The board will merely bring into view those improvements which they think it desirable to be made as early as practicable, consistent with the general credit of the state. They are as follow, viz :

First—The continuation of the canal along the north branch of the Susquehanna, from the head of the Nanticoke Pool to the New York state line.

Second—The continuation of the canal or the arrangement of a slack water navigation along the west branch of the Susquehanna, from the head of the pool at Muncy, to the mouth of Bald Eagle creek.

Third—The improvement of the navigation of the Monongahela river, by means of slack water navigation, from near Pittsburg, at least to Brownsville.

The forming a communication from Pittsburg to Erie Harbour, by means of a canal, slack water or rail-way, or by a connexion of these several means, by way of either the Beaver and Shenango, or the Allegheny.

The immediate extension of the north branch canal to the mouth of the Lackawannock, is of importance, as giving facilities for the shipment of the anthracite coal along the whole line through the Wyoming valley, which by passing down the north branch, Susquehanna and eastern divisions, will give business and tolls to the canals.

The final extension to the state line, will by a canal for a distance of sixteen miles from thence to Elmira, give a connexion through the Chemung and Seneca canals, and the Seneca and Cayuga canal with the great Hudson and Erie canal, and so will open a communication to all the interior of the state of New York. The route from the waters of the Susquehanna to the Seneca lake was deemed of sufficient importance to warrant an examination and survey by authority of the legislature of Pennsylvania as early as the time of Governor Snyder.

The extension of the west branch to Bald Eagle, so as to reach the bituminous coal region, is important, as this species of coal is of particular value in certain branches of manufactures, and as it bears a higher price in the same market than the anthracite coal. It is the true policy of Pennsylvania to cherish all her manufacturing establishments, and the rendering coal abundent and cheap is one evident means of favoring them.

The extension of the French creek feeder or canal, from its present termination to the mouth of French creek, will be of evident advantage. At present it has no beneficial communications.

The construction of a canal or slack water navigation from the mouth of Beaver creek to a point near New Castle, will be of importance to a considerable population. At one end it will be connected with the Ohio river, and form a line of communication common to the meditated canal to Erie, as well as with the canal proposed to be extended from New Castle to the Ohio canal.

The second section of an act, passed the 22d April, 1829, made it the duty of the board of canal commissioners to locate the route of a suitable navigation, either by canal or by canal and slack water, between the city of Pittsburg, or the mouth of the Kiskiminitas, and the borough of Erie, within the year 1829. With the requisitions of this act the board did not comply; but on the 17th December, 1828, when a resolution, declaring an actual location, in compliance with the law, was under consideration before the board, a substitute was offered, which stated that the board could not then make the location, but which contained an opinion in favor of a route from Pittsburg, by the Shenango to Erie. The substitute was adopted, one member voting against it. Thus a location, according to law, was not made, although a majority of the members appear, by the minutes, to have been in favor of a location on a particular route

The improvement of the Monongahela river by slack water, will be of evident advantage to the population bordering upon it. All the work necessary can be effected in one season, as the building of three or four low dams, and of as many river locks is all that will be required, in order to establish a steam boat navigation to the national road at Brownsville. The improvement of the river will facilitate the passage of the produce of the country along the Monongahela to Pittsburg, so as to take the line of the Pennsylvania canal to Philadelphia.

The following is a statement of Tolls received on the Pennsylvania canal, up to the 1st day of December, 1830.

ON THE WESTERN DIVISION.

The amount of tolls received by Thomas Johnston, collector at Blairsville, previous to the 1st November, 1830,	$7,224 79¾	
Received from the 1st of November to the 1st of December, 1830,	1,217 34	
		8,442 13¾
Amount of tolls received by David Brenneman, collector at Leechburg, prior to the 1st day of November, 1830,	3,406 63	
Received from the 1st to the 20th November, 1830,	783 89	
		4,190 52
Amount of tolls received by W. B Foster, collector at Pittsburg, up to the 1st November, 1830,	2,779 11	
Received from the 1st to the 30th November, 1830,	366,32	
		3,145 33
Whole amount of tolls received on the western division,		$15,777 98¾

EASTERN DIVISION.

The amount of tolls received by Thomas C. Reed, collector at Harrisburg, prior to the 1st November, 1830,	3,502 49½	
Received from 1st November to 1st December, 1830,	1,400 00	
		4,902 49½

JUNIATA DIVISION.

The amount of toll received by L. Reynolds, collector at Lewistown prior to the 1st November, 1830,	395 36	
Received from the 1st to the 20th November, 1830,	359 06	
		754 42
		$21,434 90½
Amount of tolls received at the bridge over Duncan's island, up to 1st of December, 1830,		5,578 00
		$27,012 90½

On the subject of damages the commissioners have only to remark that the enactments of the legislature cannot be too maturely considered as to their bearing. The commissioners are sworn to obey the principles contained in the laws as they exist, and cannot administer them as a portion of the citizens desire them to be understood. Whatever principles may be adopted and practised on, should be stable and uniform in their character, as otherwise the patriotic, the liberal or necessitous may accept the awards made them under the existing laws, whilst other claimants to whom awards may have been made, bearing a due relation to such as have been accepted, await to have their claims decided under other laws, framed on other principles.

The existing laws require that the commissioners and appraisers shall take into consideration the advantages as well as the disadvantages to the property and landed estate through which the canal shall pass. In judging of these, the parties making claims for damages invariably urge the equal benefits which some neighbour derives from the canal without losing any portion of his lands or suffering any injury, whilst he fails to take into view the fact, that his own estate is enhanced in value, or to consider the disadvantages to the citizen of other parts of the Commonwealth, from whose roads transportation, travel and business are diverted, and who, without sharing any direct portion of the benefits of the canal or of the expenditures during its construction, is required to stand responsible for his quota of the public expenditures.

It is a singular fact that on those divisions of the canal on which the smallest awards were made, the parties have generally accept-

ed the amount offered; whilst on those divisions on which the largest offers were made, the law relating to damages has been disapproved and the awards made under it, in many instances, rejected.

Since the first of July last the board have considered and decided on upwards of three hundred cases of claims for damages. A number are yet pending, to which the board could not give the necessary time and attention, consistent with what they deemed their primary duty, to wit: the necessary arrangements for the completion of the canal within the present year.

The laws provide that when the canal is finished, or within one year thereafter, persons deeming themselves injured, may present their claims for damages, and therefore but few claims have yet existed upon the commissioners to give their time to the subject of damages in preference to other duties. The commissioners cannot forbear to urge upon the legislature the necessity of their preparing and enacting a code of laws for the government of the Pennsylvania canal and rail-way. It is material that a well arranged system for the regulation and government of the extensive interests involved in these works should be matured. Well defined and efficacious laws, distinct in their purport and admitting promptitude in their application will be found absolutely necessary.

It is true the legislature have invested the canal commissioners with certain powers to enact regulations for the government of the canal and rail road, but it ought not to be expected that a few individuals, having numerous duties to perform and limited to an acquaintance with the local interests of parts only of the state, should devise a system as perfectly adapted to the general interest, as that body representing all the localities of the commonwealth, and from whose greater numbers a proportionate degree of weight and intelligence may justly be expected. The making of laws is a duty which especially appertains to the legislature. It cannot be expected that the citizens of the commonwealth will acquire as early an acquaintance with laws enacted by a board of commissioners as if they had been the subject of legislative discussion. By the debates in the legislative body not only the representatives from every part of the commonwealth acquire a knowledge of the laws and the policy and wisdom in which they are founded, but the reasons of the law are promulgated and diffused amongst the citizens at large, who stand ready to yield obedience and support to the acts of the highest authority of the land. The passage of laws through all their deliberate forms, discussed and sanctioned by the representatives of the people and approved by the chief magistrate of their choice, ever will meet a respect which will be yielded to no subordinate power.

The legislature will find on the minutes of the board an extensive system prepared by the canal commissioners and adopted under the powers imparted to them by the legislative act of 1830. This system though imperfect may be found useful in enabling the legislature to arrange a better.

On the 20th of March, 1829, the former board of canal commissioners passed the following resolution: "Resolved that the superintendent and engineer on the French creek feeder be directed, during the ensuing summer, to survey and plot definitively that portion of the contemplated canal between Conneaut lake and the basin at Erie, by the route reported by the board to the legislature at its present session, and report to this board, when completed, the estimate of expense of construction, with profiles and maps of the same."

Mr. Ferguson, the then principal engineer upon the feeder having been transferred to the Juniata division, this duty was afterwards assigned to B. B. Vincent, the principal assistant engineer on the feeder. His report and estimate are herewith submitted; as also a report and estimate of the same line, made by Wm. Dickson, the former superintendent upon the feeder.

Under the provisions of the 2nd section of the act of the 27th of March last, making further appropriations for canals and roads, the board, on the same day on which the law was passed, opened a correspondence with three skillful and experienced engineers with a view to the examination of the different routes for crossing the Allegheny mountain. Owing to other engagements of the engineers, designated the organization of the party for making the the surveys and examinations contemplated by the legislature, was unavoidably delayed until late in the month of July. The engineers appointed were Moncure Robinson, Col Stephen H. Long, and Major John Wilson. They were instructed by the board in making their examinations under the provisions of the act of assembly, to take into view a portage by means of a road so graded as to admit of its being adapted either to a Macadamized turnpike or to a rail-road In the course of the summer a thorough examination of the mountain has been made. The engineers were not enabled to close their examinations until some time in the present month nor to make any communication until their report, in part, of the 18th instant, which was received by the board on the 20th, and which is herewith submitted, relating to the route and plan of crossing the mountain.

This report, together with the report upon the same subject made by Moncure Robinson in 1829, will furnish such facts as are necessary to come to a conclusion as to the route and manner of crossing the Allegheny mountain. No estimate of the cost has yet been received, the engineers not having had time to report upon that subject.

Signed by order of the board,

JAS. S. STEVENSON, *President.*

ATTEST.

FRS. R. SHUNK, *Secretary.*

Harrisburg, December 21, 1830.

Document No. 1.

To the Board of the Canal Commissioners of the State of Pennsylvania:

Gentlemen:

In conformity to an act of the Legislature of Pennsylvania, dated on the 27th of March, 1830, authorizing the appointment of Engineers for the performance of certain duties therein specified, the undersigned having had the honour to be selected by the Board of Canal Commissioners, to carry into effect so much of said act as relates to the Allegheny Portage, and having devoted, so far as it has been practicable, their careful attention to the several subjects confided to their decision, embrace this early opportunity to report, *in part*, the facts developed by their investigations, together with a few of the leading conclusions to which they have been enabled to arrive. They at the same time beg leave to apprize the Board of Canal Commissioners, that the lateness of the season, at which their field operations were unavoidably commenced, and the inadequacy of the force employed in the execution of the complicated surveys that have been deemed essential to a proper knowledge of the several routes claiming attention, render it utterly impracticable to present at this time a full report, embracing all the topics connected with the duties in which they have been engaged, and for which their services were required.

The first object to which the attention of the engineers was directed, was that of ascertaining the localities and other circumstances connected with the several routes that have been proposed. With this object in view, they had recourse to the various documents relating to the Allegheny Portage, that have on former occasions been submitted to the Legislature. From these it appeared that the first route surveyed with a view to a portage road communicating between the Juniata and Conemaugh rivers, was that explored agreeably to the directions of Canvas White, Esq in 1827, leading from a point near the junction of the constituent branches of the Juniata, and about one and a half miles above Frankstown, to the confluence of the N. and S. Forks of the Little Conemaugh, and thence downward to Johnstown. The line run on this occasion however, is to be regarded merely as experimental, and led to no other results, except that of determining the elevations of several points, and the distances between them; very little attention having been paid either to the adoption of a system, or to its adaptation to the natural surface. With respect to the results above mentioned, it should be added, that subsequent surveys have sufficiently established their accuracy. The bench mark, made at the Bob's creek summit, in connexion with this route, has served as a land mark, to which all subsequent surveys in this direction have been referred.

The next surveys that were instituted for the same object, were made in the year following (1828,) under the direction of N. S. Roberts, Esq. These surveys embraced a comparatively broad range of country, extending from Frankstown westwardly to Johnstown, and from the Blue Knob northwardly to the Sugar run summit.

The object of these surveys, appears to have been to ascertain the practicability of a route for a rail-road, leading across the summit of the Allegheny mountain, at a uniform inclination or declivity, not exceeding one or one and a half degrees, excessive curvatures and deviations from a direct course, having been accounted less objectionable than a vertical rise or depression, greater than the limit prescribed. The routes surveyed and designated on this occasion, in addition to numerous experimental routes, which were abandoned as impracticable, amounted to no less than five in number, no part of either of which had an inclination exceeding one and a half degrees. A brief description of the several routes alluded to, beginning at the most southerly, and ending at the most northerly, will here be attempted; and since they are respectively to be regarded as a link in the great chain of intercommunication, stretching through the state, from Philadelphia to Erie, as well as for the purpose of giving a better understanding of their comparative merits, it will be proper to consider them as connected with the main chain at such points as will admit of a common junction of all the routes. With this view the points selected are Frankstown and Johnstown, between which the distances by all the routes will be estimated.

	Distances in miles.	Heights of summits in feet. above Frankstown	above Johnstown
Route No. 1, *by N. S. Roberts, Esq.* From Frankstown, by way of M'Key's Gap, south side of Blue Knob, Bob's creek summit, Ben's creek and Little Conemaugh, to Johnstown.	51 1/3	1590	1343
Route No. 2, *by N. S. Roberts, Esq.* From Frankstown, by way of Newry, north side of Poplar run, Bob's creek summit, Ben's creek, and Little Conemaugh, to Johnstown.	49 3/4	1590	1343
Route No. 3, *by N. S. Roberts, Esq.* From Frankstown, by way of Hollidaysburgh, south side of turnpike, Sugar run summit, Laurel run and Little Conemaugh, to Johnstown.	51	1419	1166
Route No. 4, *by N. S. Roberts, Esq.* From Frankstown, by way of Hollidaysburgh, Blair's Gap, north side of turnpike, Sugar run summit, &c. as in route No. 3.	50 3/4	1419	1166
Route No. 5, *by N. S. Roberts, Esq.* From Frankstown, by way of Hollidaysburgh, north side of Sugar run, Sugar run summit, &c. to Johnstown, as in route No. 3.	47 1/8	1382	1129

In 1829, an examination and survey of the Allegheny portage, was executed under the direction of Moncure Robinson, Esq. in

conformity to certain principles adopted by him, as best adapted to the nature and condition of the portage, and to the exigencies of the contemplated road. Among the leading considerations recommended by this gentleman, as governing principles in the location of the road, are a reduction of the height of the summit, at the expense of a tunnel a mile long, the construction of inclined planes, horizontally direct, but varying in their inclinations from six to nine, and in one instance, to about thirty degrees; the adoption of self acting planes, as a means of conveying loads upward and downward, on the east side of the mountain; the employment of stationary power, on all of his inclined planes, to the exclusion of a power moving with its load, &c.

A majority of the board of engineers, who had as yet acquired no personal knowledge of the localities to be traversed by the contemplated road, nor of the nature of the obstacles to be overcome, were desirous of instituting a course of examinations and surveys, the leading objects of which were to obviate the necessity of constructing a tunnel at the summit, till such time as the exigencies of the trade upon the road should require it; to avoid the adoption of inclined planes having inclinations greater than five degrees, and if possible, to limit their inclination to three degrees; to provide for a route upon which not only *stationary* but *progressive* power might operate to advantage, according to circumstances; to effect a definitive location of a route upon ground most favourable for the construction of a road in regard to the principles as well as to the cost of construction, &c.

With these objects in view, and at the instance of a majority of the engineers, a party was organized early in the month of August last, and placed under the immediate direction of Lt. Col. Long, who has ever since devoted his unremitted personal attention to the field operations in which the party have been engaged, from the date of their organization to the present time. The operations of the party were performed in the following order, and lead to the results hereinafter exhibited, viz:

First, the survey of a *crest line* leading along the main summit of the Allegheny mountain from the Sugar run summit to the Cedar Swamp summit, and embracing a distance of about fourteen miles. The results obtained by this survey gave for the comparative elevations of the several gaps in the comb or crest of the mountain, the following altitudes above the level of the Sugar run summit, which last proved to be the lowest depression of the mountain, viz:

Assuming *zero* as the elevation of the Sugar run summit, its height will be,			.0 feet.
Height of Blair's Gap summit above	Sugar run summit,		49
do	Adams' summit above	do	175
do	Laurel summit above	do	222
do	Big Spring summit above	do	304
do	Bob's creek summit above	do	213
do	Cedar Swamp summit above	do	167

The comparative altitude of the mountain on other parts of the crest line, as deduced from actual observations, varied from fifty to five hundred feet above the level of the Sugar run summit, 1238 to 1738 feet above Johnstown, or 1418 to 1918 feet above Frankstown.

2d. The survey and definitive location of a route for a rail-road from Hollidaysburgh to Johnstown, passing northwardly of the turnpike, from a point about one fourth of a mile westward of the former place to a point about three fourths of a mile westward of the summit of the mountain, which is crossed by the route at the depression called the Blair's Gap summit, thence southwardly and westwardly, along the vallies of the Laurel run, and the Little Conemaugh, on the south side of the latter, to a point a little below Burk's Saw mill, where the route crosses the Little Conemaugh; thence downward on the north side of that stream, to the gorge of the Horse Shoe Bend, where it crosses the Conemaugh at an elevation of about 60 feet above the surface of low water, requiring a bridge only 500 feet long; thence downward on the south side of the Conemaugh to the gorge of the Staple bend, through which it passes in a distance of 1000 feet, at an elevation of about 80 feet above the surface of the Conemaugh, and at a depression of about 250 feet below the crest of the ridge intervening between the Conemaugh and the mouth of Deep run, requiring for its passage through the gorge, a tunnel 1000 feet long; and thence downward along the south side of the Conemaugh to Johnstown.

This route embraces eleven inclined planes, viz: six on the east and five on the west side of the mountain. Some idea of the character and properties of these planes, may be derived from the following statements, which are necessarily incomplete, in consequence of the unavoidable absence of the field notes, from which alone their precise dimensions, &c. can be drawn. The planes are numbered from east to west, in the order of their occurrence on the route from Frankstown to Johnstown.

Inclined Planes,	Inclination.	Approximate length.
No. 1 (East of mountain.)	1° to 1° 15′	about $\frac{1}{4}$ mile.
No. 2 "	2° to 2° 30′	" $\frac{1}{2}$ mile.
No. 3 "	2° 35′	" $\frac{7}{8}$ mile.
No. 4 "	2° 35′	" 1 mile.
No. 5 "	4° 35′	" $\frac{3}{5}$ mile.
	2° 53′	" 1 mile.
No 6 "	4° 56′	" $\frac{3}{5}$ mile.
	2° 53′	" 1 mile.
No. 7 (West of mountain,)	2° 40′	" 1 mile.
No. 8 "	2° 53′	" $\frac{4}{7}$ mile.
No. 9 "	2° 53′	" $\frac{4}{7}$ mile.
No. 10 "	2° 53′	" $\frac{2}{3}$ mile.
No. 11 "	2° 53′	" $\frac{2}{5}$ mile.

In connexion with the inclined planes No. 5 and No. 6, as exhibited in the foregoing table, it will be perceived, that the statements are carried out in duplicates, the reason whereof is, that

the most direct route presented by the conformation of the hills would not admit of a graduation at an angle less than the larger inclination therein contained; also, that in order to effect a location, at an inclination not exceeding three degrees, a longer and more circuitous route would be required, as exhibited in the duplicate connexion.

Those parts of the route situated between the inclined planes, and exteriorly of them, were located at an inclination, ascending towards the summit of the mountain, in no case exceeding a rise of thirty feet in the distance of a mile, except on that portion of the route situated between Duncan's tavern, and the Hollidaysburgh bridge, about two miles, on which a rise of about 42 feet per mile, was deemed more conducive to economy.

3d. The survey of an experimental line or route leading through Newry, ascending the valley of North Poplar run, and its south branch, crossing Bob's creek near its intersection with the road leading from Frankstown to Johnstown, crossing the Allegheny mountain at a point called the Cedar swamp summit, and descending to the Conemaugh, by the vallies of the Cedar run and south fork of Conemaugh.

The uncertainty that existed in reference to the distance and facilities presented by this route, and the difficulty of forming a correct opinion as to its relative merits without an actual survey, rendered this part of the service obligatory if not essential to a competent discrimination between the several routes claiming the attention of the engineers.

The same principles that governed in the location of the Blair's Gap route were applied here, with such modifications as any change in the aspect or condition of the country through which the line passed, seemed to require. The leading peculiarities presented by this route, were a variableness in the grade best adapted to the natural surface, ranging from an ascent of ten to ninety feet per mile, on the first nine miles above Frankstown, the necessity of one or more five degree planes in passing thence to the summit of the ridge, dividing between Poplar run and Bob's creek; the occurrence of numerous ravines, and mountain spurs, requiring heavy embankments and deep cuttings, eastwardly of the main summit, and a declivity of about 40 feet per mile, on the last four miles situated immediately above the confluence of the N. and S. forks of the Conemaugh. From the point last mentioned to Johnstown, a distance of $8\frac{3}{4}$ miles, this route is coincident with the route just before described.

In addition to the routes above considered, numerous other lines were traced and levelled as preliminary to the adoption of the most favorable route, amounting in the aggregate to a distance of nearly 200 miles.

These several routes, together with that surveyed in 1829, respectively prolonged so as to embrace the entire distance from Frankstown to Johnstown, will be exhibited in continuation of the list presented in the former part of this essay, and in the following order, viz:

	Lengths of routes in miles	Heights of summits in feet. above Frankstown	above Johnstown.
Route No 6, by M. Robinson Esq			
From Frankstown by way Hollidaysburg, south side of turnpike, Blair's Gap summit, along the vallies of Laurel run and Little Conemaugh, crossing the latter six times, to Johnstown,	40¾	1279	1028
Route No. 7, by Lt. Col. Long.			
From Frankstown by way of Newry, Poplar run, Bob's creek, Cedar swamp summit, Cedar run, S. fork of Conemaugh, and Little Conemaugh, to Johnstown, crossing Conemaugh only twice,	39¼	1514	1257
Route No. 8, by Lt. Col. Long.			
From Frankstown, by way of Hollidaysburgh, north side of turnpike, Blair's Gap summit, and downwards in vallies of Laurel run and Conemaugh, crossing the latter twice only, to Johnstown, crossing the summit by means of planes, limited to inclinations of three degrees,	39¼	1397	1137
Route No. 9. by Lt. Col Long.			
From Frankstown, by way of Hollidaysburgh, &c. as in the preceding route No. 8, to Johnstown, arriving at the summit by means of two planes of an inclination less than five degrees each, the inclination of the other planes, being limited to less than three degrees,	33½	1397	1137

The several routes claiming the attention of the engineers having been thus considered, their relation to a direct line extending from Frankstown to Johnstown, deserves particular attention. Such a line, traversing the country between the points above mentioned, would have a course bearing S. 74° W. from Frankstown, and an extent of about thirty-one miles. It would cross the crest of the Allegheny mountain near the Big Spring summit, or about one and a fourth miles northwardly of Bob's creek summit. Its direction thence to Johnstown is nearly parallel to the general course of the Conemaugh from Lilly's mill to the gorge of the Horse-shoe Bend, and of course to that of the routes Nos. 6, 7, 8 and 9, which pursue the valley of the Conemaugh through that distance. Any route meriting attention from its general proximity to the direct line, and passing through either of the depressions in the summit noticed in a former part of this paper, must pass in the vicinity of Hollidaysburgh, ascend the valley of Blair's Gap run to the turnpike gate; thence pursue its main branch, and a small tributary of the latter, to

the Laurel or Adams' summit, and thence downward along one of the brances of Bear Rock run to Lilly's mill; and thence by routes Nos. 7, 8 and 9 to Johnstown. Anxious inquiries were made with a view of ascertaining the practicability of a route in this direction, which were rendered fruitless in consequence of the great elevation of those summits. With this exception no route was presented maintaining a nearer parallelism with the direct line than those passing through Blair's Gap.

A map of the country embracing the Allegheny portage, and exhibiting the several routes treated of in this essay, on a scale of one inch to the mile, is now in progress and will be presented to the board as soon as practicable. A view of such a map will impart more satisfactory information with respect to the geography of the country, the position of the several routes, and their relations to the eastern and western divisions of the Pennsylvania canal, than volumes of description could give without it.

Drawings, in plan and profile, illustrative of the horizontal and vertical positions of the located route, and of the particular topography in its vicinity, accompanied by suitable remarks on the aspect, geology, &c. will be prepared and submitted at the earliest practicable date.

An estimate of the cost of grading and bridging, as also of any other structures that may be deemed essential to a portage road, best calculated to subserve the purposes for which such a road is required, will also be submitted, in company with a final decision in reference to the manner of crossing the Allegheny mountain.

In view of what has been advanced in this paper, and in accordance with impressions derived from personal examinations of the country traversed by the several routes that have been proposed for the portage road, the undersigned feel warranted in awarding their decided preference to a route leading upward along the valley of Blair's Gap run, crossing the Allegheny mountain at the Blair's Gap summit, and descending to Johnstown, in the vallies of Laurel run and the Little Conemaugh.

The engineers having been directed by the canal commissioners, in conformity to a resolution of the board, dated March 27, 1830, to ascertain how far it might be eligible to construct a Macadamized turnpike across the Allegheny mountain, as a method for transportation, have made such surveys as were not only requisite for attaining that object, but might also be applicable for the construction of a rail-road.

The undersigned have accordingly no hesitation in giving a decided opinion in favor of the superior advantages of a rail-way over a turnpike, however well constructed, and whatever known power be applied for the propulsion of loaded carriages.

All which is respectfully submitted.

Harrisburg, Dec. 18th, 1830.

S. H. LONG, *Top. Eng'r. Bt. Lt. Col.*
JOHN WILSON, *Civil Engineer.*

FRS. R. SHUNK, Esq.
Sec'y. Board of Canal Commisioners.